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TRANSMITTAL LETTER
(General - Patent Pending)

Docket No.
4488

In Re Application Of: Chen, et al.

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
09/804,328	March 12, 2001	Edward M. Johnson	48226	1754	1020

Title: **Selective Catalytic Reduction of N2O**

COMMISSIONER FOR PATENTS:

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Reply to Notification of Non-Compliant Appeal Brief- 1 sheet
Replacement Appeal Brief- 11 sheets

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Signature

Dated: **March 31, 2008**

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cc:

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Chen et al.	Art Unit: 1754
Serial No: 09/804,328	Examiner: Edward M. Johnson
Filing Date: March 12, 2001	
Title: *Selective Catalytic Reduction of N_2O*	Atty. Docket No.: 4488

Reply to Notification of Non-Compliant Appeal Brief

Commissioner of Patents
and Trademarks
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sirs,

The Examiner has indicated that the Appeal Brief filed December 13, 2007, is not compliant since the brief does not contain a correct copy of the appealed claims or any other required appendices. Accordingly, Applicant encloses herein a replacement Appeal Brief including the required appendices.

Applicant respectfully requests submission of the enclosed Appeal Brief.

3/31/2008
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Respectfully submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Chen et al.	Group Art Unit: 1754
Serial No.: 09/804,328	Examiner: Edward M. Johnson
Filed: March 12, 2001	
Title: *Selective Catalytic Reduction of N_2O*	Atty. Docket No. 4488

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APPEAL BRIEF

Real Party Of Interest

The real party of interest in this case is BASF Catalysts LLC.

Related Appeals And Interferences

There are no appeals or interferences known to be related to or have a bearing on the Board's decision in the pending appeal.

Status Of Claims

Claims 3, 5-7, 10-14 and 18 are pending and have been Finally Rejected. These Finally Rejected claims form the basis of this appeal. Claims 1, 2, 4, 8, 9, 15-17, and 19-24 have been canceled.

Status Of Amendments

No amendment or response under 37 C.F.R. 1.116 has been filed subsequent to the Final Rejection dated April 19, 2007.

Summary Of Claimed Subject Matter

The presently claimed invention as set forth in sole independent claim 18 is directed to the selective catalytic reduction of NOx to achieve simultaneous removal of NOx and N_2O from a single process stream, page 6, lines 26-29. The inventive simultaneous removal of NOx and N_2O in a single process stream is achieved by introducing ammonia into the process stream upstream of a catalyst bed, page 7, lines 1-2. In accordance with this invention, the gas stream containing both NOx and N_2O is passed in contact with a beta zeolite, page 7, lines 4-9. The gas stream has a temperature over 250°C, page 6, lines 1-2.

Ground Of Rejection To Be Reviewed On Appeal

1. Claims 3, 10-14 and 18 have been Finally Rejected under 35 USC 103 (a) as being unpatentable over Riley et al. (US 5,200,162) in view of Fetzer (US 6,056,928). The Examiner states that Riley discloses a process for nitrous oxide decomposition comprising contacting a nitrous oxide and NOx stream with ammonia and zeolite. The Examiner recognizes that Riley fails to disclose beta zeolite for the simultaneous reduction of the nitrogen compounds. The Examiner applies Fetzer as disclosing a beta zeolite and concludes it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the beta zeolite of Fetzer selective for simultaneous reduction in the process of Riley. The Examiner also states that Riley discloses a temperature of reaction of 150-550 °C and discloses iron-exchanged zeolites.

2. Claims 3, 5-7, 10-14 and 18 have been Finally Rejected under 35 USC 103 (a) as being unpatentable over Kato et al. (US 4,571,329) in view of Fetzer as mentioned above. The Examiner applies Kato as disclosing a process for ammonia reduction of nitrous oxide comprising contacting a nitrous oxide containing gas with ammonia and zeolite and discloses removal of NOx and N_2O. The Examiner admits that Kato fails to disclose beta zeolite selective for the simultaneous reduction of the nitrogen compounds. Fetzer is applied as previously as disclosing a beta zeolite. The Examiner concludes it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the beta zeolite of Fetzer in the nitrous oxide decomposition process of Kato. The Examiner states that Kato discloses a temperature of reaction of 300-500 °C and an iron-exchanged zeolite.

3. Claims 3, 10-11, and 18 have been Finally Rejected under 35 USC 103 (a) as being unpatentable over Tsuchitani et al. (US 5,756,057) in view of Fetzer as mentioned above. The Examiner states that Tsuchitani discloses a method for removal of NOx comprising contacting a stream containing N_2O with a reducing agent such as ammonia and a catalyst comprising a zeolite. The Examiner admits that Tsuchitani fails to disclose beta zeolite. Fetzer is applied as previously as disclosing a beta zeolite. The Examiner concludes it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the beta zeolite of Fetzer in the nitrous oxide decomposition process of Tsuchitani et al.

Argument

1. ***Claims 3, 10-14 and 18 have been Finally Rejected under 35 USC 103 (a) as being unpatentable over Riley et al. (US 5,200,162) in view of Fetzer (US 6,056,928).*** With respect to the rejection based on the combination of Riley in view of Fetzer, it is Appellants position that the applied references in combination do not suggest or render obvious the claimed process and in particular, do not suggest that a beta zeolite could be

effective for the simultaneous reduction of N_2O and NOx in a gas stream further containing ammonia.

First, Riley is concerned with the decomposition of N_2O in a gas stream and not the simultaneous decomposition of N_2O and NOx. In fact, the Abstract of Riley states that when the N_2O containing gas stream also contains NOx, it is "often highly desirable to pretreat the stream to remove NOx prior to the N_2O-decomposition zone." Further, column 3, lines 45-50 of Riley states that when the gas stream contains other oxides of nitrogens such as NOx, the process "may need to be modified to remove NOx prior to the N_2O decomposition zone."

In Riley, the N_2O-containing feedstock is passed into a decomposition zone containing a solid catalyst. The solid catalyst can be a variety of materials including zeolites, column 4, lines 34-39. The types of zeolites are disclosed at column 5, lines 5-24. Zeolite beta is not disclosed. In column 8, lines 25-59, Riley discloses the need to remove NOx prior to his process of decomposing N_2O. Riley states in the mentioned passage that "the effectiveness of many catalyst for N_2O decomposition is significantly impaired by NOx." In the same mentioned passage, Riley states "the presence of NOx in the N_2O-containing feed gas is detrimental. In theses cases it is highly desirable to remove NOx in a zone prior to the N_2O decomposition zone." Riley then discloses methods which can remove the NOx prior to the decomposition of the N_2O stream including the selective reduction of NOx with ammonia in the presence of oxygen and catalyzed by precious metals. Clearly, Riley does not teach nor suggest the use of <u>any</u> catalyst which is selective for the "simultaneous reduction of N_2O and NOx" as claimed let alone the use of beta zeolite.

The secondary reference to Fetzer is directed to a multistage process for removing nitrogen oxides from a gas stream. Fetzer neither discloses simultaneous removal of N_2O and NOx from a gas stream nor suggest that zeolite beta can be used to catalyze the ammonia-mediated reduction of these nitrogen oxides. Fetzer discloses a three-stage

process. In Stage A adsorption of nitrogen oxides other than N_2O is achieved such as by the use of water, column 2, lines 43-48. In Stage B, the amount of N_2O is reduced by the use of a heterogeneous catalyst. Among examples of catalysts used is zeolite beta, column 4, line 15. The zeolite catalyst may be exchanged with various metals, column 4, lines 20-21. In a preferred embodiment, a Stage C is used in which the gas stream from Stages A and B can be passed through Stage C for reducing nitrogen oxides other than N_2O. In Stage C the gas stream can be reacted by means of selective catalytic reduction (SCR) in which the nitrogen oxides are reacted with ammonia. The catalysts for the SCR reaction are set forth at column 4, lines 47-57. Zeolite beta is <u>not</u> disclosed for Stage C.

Accordingly, the secondary reference does not teach the simultaneous reduction of N_2O and NOx. The secondary reference does not suggest use of zeolite beta in a reaction with ammonia. At best, Fetzer discloses in Stage B the use of beta zeolite for reducing the amount of N_2O in the <u>absence of ammonia</u>. Thus, it is Appellant's position that even the substitution of beta zeolite in the process of Riley does not meet the claimed process which is directed to the simultaneous reduction of N_2O and NOx. Riley separately converts NOx and N_2O. The patent recites that it is highly desirable to remove NOx prior to the N_2O decomposition zone. Fetzer does not make up for this deficiency of Riley. Moreover, Fetzer does not suggest that beta zeolite can be used to reduce either N_2O or NOx in the presence of ammonia. In fact, Fetzer uses beta zeolite <u>without</u> ammonia. Accordingly, the combination of Riley with Fetzer does not suggest the effective simultaneous reduction of N_2O and NOx with ammonia using zeolite beta.

2. ***Claims 3, 5-7, 10-14 and 18 have been Finally Rejected under 35 USC 103 (a) as being unpatentable over Kato et al. (US 4,571,329) in view of Fetzer as mentioned above***. It is further Appellant's position that the rejection based on the combination of Kato et al. in view of Fetzer is not proper. Kato discloses in column 5, lines 18-56, the ammonia reduction of NO_2 employing a reactor having filled a large amount of catalyst which is active to both the reaction of NO_2 with ammonia and the ammonia reduction reaction of N_2O. The reaction takes place in the presence of a zeolite

catalyst such as an H or Fe substituted zeolite catalyst such as mordenite, zeolite Y, and the other zeolites disclosed in column 4, lines 43-49. Zeolite beta is not disclosed.

It is believed that the Examiner's reliance upon Fetzer as discussed above to disclose the use of beta zeolite for the reaction in Kato is improper. As stated above, Fetzer is not concerned with the ammonia reduction of N_2O in the presence of beta zeolite. It is the Appellants who have discovered that zeolite beta can be effectively used for the simultaneous reduction of NOx and N_2O with ammonia. Neither Kato et al. which does not disclose zeolite beta nor Fetzer which discloses zeolite beta but not in a reaction which involves ammonia suggest or render obvious what Appellants have found.

The Board is kindly invited to Figure 8 of the present application and the discussion thereof on page 11, line 25 through page 12, line 4. The results as disclosed therein are not suggested by the combination of references.

Page 11, line 25 through page 12, line 4 discusses that the zeolite beta catalyst was unable to provide NOx conversion in a gas containing both NOx and N_2O without the addition of ammonia (Figure 7), but by introducing ammonia into the gas stream containing both NOx and N_2O, conversions of both these nitrogen compounds over zeolite beta were increased substantially, Figure 8.

3. ***Claims 3, 10-11, and 18 have been Finally Rejected under 35 USC 103 (a) as being unpatentable over Tsuchitani et al. (US 5,756,057) in view of Fetzer as mentioned above.*** It is believed that the rejection based on the combination of Tsuchitani et al. in view of Fetzer is improper. Appellants point out that Tsuchitani et al. is not concerned with the simultaneous reduction of NOx and N_2O. Tsuchitani discloses a first step of oxidizing nitrogen oxides such as NO, N_2O, etc. which are present at high proportions in the NOx components of an exhaust gas into NO_2. The NO_2 thus resulting from the oxidation step is then adsorbed on a component possessing NO_2 adsorbing ability. By introducing a reducing substance such as ammonia instantaneously into the

exhaust gas enveloping the NOx accumulated on the adsorbent component, the adsorbed NOx is reduced or decomposed, column 4, lines 32-46. Thus, it is uncertain whether the gas which is treated with ammonia in Tsuchitani contains N_2O since it is the purpose of the reference to initially convert NO or N_2O, etc. to NO_2. The only disclosure of a zeolite used in the primary reference appears to be Example 21 where ZSM-5 is utilized. However, the primary reference does not suggest simultaneous reduction of NOx and N_2O with ammonia as set forth in the claims. Accordingly, even if Fetzer were combinable with the primary reference, the combination would not teach or render obvious the claimed process. Again, as stated above, Fetzer is not concerned with the use of beta zeolite to reduce N_2O in the presence of ammonia. It is the Appellants who have found that zeolite beta is particularly useful for the simultaneous reduction of NOx and N_2O with ammonia.

It is respectfully requested that the Final Rejection of claims 3, 5-7, 10-14, and 18 be reversed.

Respectfully Submitted,

Date 3/31/08

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EVIDENCE APPENDIX

No evidence submitted.

RELATED PROCEEDINGS APPENDIX

Not applicable.

CLAIMS APPENDIX

3. A method as recited in claim 18, wherein the gas stream has a temperature of from about 350°C to about 600°C.

5. A method as recited in claim 18, wherein the ammonia/N_2O concentration ratio is up to about 2.0 based on the total volume of the gas stream.

6. A method as recited in claim 18, wherein the ammonia/N_2O concentration ratio is at least about 0.5 based on the total volume of the gas stream.

7. A method as recited in claim 18, wherein the ammonia/N_2O concentration ratio is from about 0.8 to about 1.0 based on the total volume of the gas stream.

10. A method as recited in claim 18, wherein the zeolite is ion-exchanged with at least one type of ion selected from the group consisting of Fe, Cu, Co, Ce, Pt, Rh, Pd, Ir, Mg and combinations thereof.

11. A method as recited in claim 18,wherein the zeolite is ion-exchanged with at least one type of ion selected from the group consisting of Fe, Ce, Cu, Co and combinations thereof.

12. A method as recited in claim 18, wherein the N_2O concentration of the gas stream is about 1% or less.

13. A method as recited in claim 18, wherein the N_2O concentration of the gas stream is about 5,000 ppm or less.

14. A method as recited in claim 18, wherein the N_2O concentration of the gas stream is between about 20 ppm and about 5,000 ppm.

18. A method for ammonia-mediated N_2O and NOx reduction, comprising contacting a gas stream containing N_2O and NOx with ammonia and a catalyst comprising a BETA zeolite which is selective for the simultaneous reduction of N_2O and NOx, wherein the gas stream containing ammonia, nitrous oxide and NOx has a temperature of greater than about 250°C.